Model Question Paper

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I P.U.C: MATHEMATICS (35)

Time : 3 hours **Max. Marks : 80**

Instructions :

1) *The question paper has five parts namely A, B, C, D and E. Answer all the parts.*

2) *PART A has 15 MCQ's ,5Fill in the blanks of 1 mark each.*

3) *For questions having figure/graph, alternate questions are given at the end of question paper in separate section for visually challenged students.*

PART A

I. Answer ALL the Multiple Choice Questions **15 ×1 = 15**

1. If U is universal set and A ⊂ U, then U′∩A =

A) A B) U C) A′ D) ∅.

2. If (x - 1, y + 2) = (1 , 5), then (x, y) is

A) (1, 2) B) (2, 3) C) (3 , 2) D) (2 , 1)

3. Match List I with List II

List I	List II
a) Domain of $sinx$	i) $(-\infty, \infty) - \{n\pi : n \in Z\}$
b) Domain of $cotx$	ii) $[-1, 1]$
c)Range of $cosx$	iii) $(-\infty, \infty)$

Choose the correct answer from the options given below:

A) a-i , b-ii, c-iii B) a-iii, b-ii, c-i

C) a-ii, b-i, c-iii D) a-iii, b-i, c-ii

4. The conjugate of a complex number $-5 + 3i$

(A) -5-3i (B) 5-3i (C)) - 5 + 3i (D) 5+3i.

5. The solution of $-8 \leq 5x - 3 < 7$ is

(A) $-1 \leq x < 2$. *B)* $-1 < x \leq 2$ *C)* $-1 \leq x \leq 2$ *D)* $2 < x \leq -1$.

6. If $\frac{1}{6!}+\frac{1}{7!}=\frac{x}{8!}$, then x =

(A) 56 (B)49 (C)64 (D) 81.

7. The value of $10_{C_1}+10_{C_2}+10_{C_3}+\cdots\ldots\ldots\ldots+10_{C_{10}}$ is

(A) 1024 (B) 1023 (C) 1022 (D) 512

8. The 4th term of the sequence defined by $a_1=1=a_2$ $a_n=a_{n-1}+a_{n-2}, n>2$ is

(A) 9 (B) 5 (C) 2 (D) 3.

9. Equation of the line parallel to x- axis and passing through (-2,3) is

(A) $x=3$ (B) $x=-2$ (C) $y=-2$ (D) $y=3$.

10. The length of the latus rectum of the parabola y^2 = -9x

(A) 9 (B) -9 C) $\frac{9}{4}$ D) $\frac{9}{2}$.

11. The eccentricity of the hyperbolas: $\frac{x^2}{9}-\frac{y^2}{16}=1$

(A) $\frac{5}{4}$ (B) $\frac{5}{3}$ (C) $\frac{18}{4}$ (D) $\frac{32}{3}$.

12. **Statement 1:** The perpendicular *distance from the point P(6, 7, 8) to* zx- plane is 7

Statement 2 : The shortest distance of the point (a, b, c) from the x-axis is $\sqrt{b^2+c^2}$

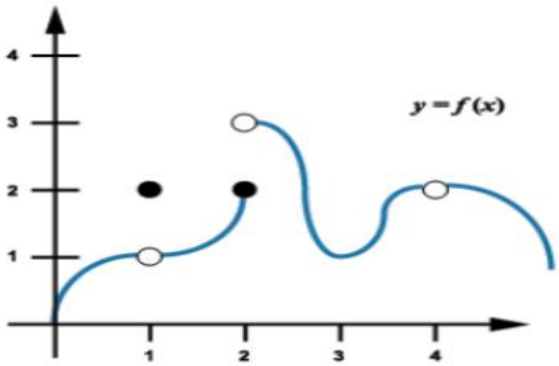
A) Statement 1 is true and Statement 2 is false.

B) Statement 1 is false and Statement 2 is false.

C) Statement 1 is true and Statement 2 is true, Statement 2 is not a correct explanation for Statement 1

D) Statement 1 is true and Statement 2 is true, Statement 2 is a correct explanation for Statement 1

13. For the figure given below, consider the following statements 1 and 2



Statement 1: The given function limit exists at x =1,x = 2 and x = 4

Statement 2: The given function limit exists at at x=3

A)Statement 1 is true and Statement 2 is false

B) Statement 1 is false and Statement 2 is true

C)Both Statement 1and 2 are true

D)Both Statement 1 and 2 are false

14. Mean deviation about median for first 5 natural numbers is

(A) 5 (B) $\frac{6}{5}$ (C) 6 (D) $\frac{5}{6}$.

15. The number of simple events corresponding to the sample space "two coins are tossed once" is

A) 1 B) 2 C) 3 D) 4 .

II. Fill in the blanks by choosing the appropriate answer from those given in the bracket. (0,1, 2, 3, 4, 5,) **5 ×1 = 5**

16. If A = { 2, 4, 6, 8} and B = { 6, 8, 10} ,then n(A - B) .....

17. If $5x - 3 < 3x + 1$, when x is a natural number. The number of values of x is .....

18. If ${}^{15}C_{3r} = {}^{15}C_{3+r}$ then r ---------

19. The values of k for which the line $(k-5)x-(4-k^2)y+k^2-7k+6 = 0$ is parallel to the y-axis is ---------

20. The derivative of $f(x) = 4x$ at $x = 0$ is ---------

PART-B

ANSWER ANY SIX QUESTIONS **6 × 2 = 12**

21. If A= { 3, 5, 7, 9, 11}, B= { 7, 9, 11, 13}, C= {15, 17} find A∩(B∪C).

22 In a circle of diameter 40 cm, the length of a chord is 20 cm. Find the length of minor arc of the chord.

23. Prove that $(\sin 3x + \sin x)\sin x + (\cos 3x - \cos x)\cos x = 0$.

24. If $x + iy = \frac{a+ib}{a-ib}$, prove that $x^2 + y^2 = 1$.

25. In how many ways can a team of 3 boys and 3 girls be selected from 5 boys and 4 girls?

26. Using Binomial Theorem evaluate $(99)^5$.

27. In a G.P, the third term is 24 and the 6^{th} term is 192. Find the 10^{th} term.

28. Find the equation of the circle with centre (2,2) and passes through the point (4,5).

29. A fair coin with 1 marked on one face and 6 on the other and a fair die are both tossed find the probability that the sum of numbers that turn up is 12.

PART –C

ANSWER ANY SIX QUESTIONS : **6 × 3 = 18 .**

30. If U={ 1,2,3,4,5,6 }, A={ 2,3 } and B={ 3,4,5 } verify $(A \cup B)^{/} = A^{/} \cap B^{/}$.

31. Determine the domain and range of the relation R defined by

R = {(x, x + 5): $x \in$ {0, 1,2, 3, 4, 5}}.

32. Show that tan 3 x tan 2 x tan x = tan 3x – tan 2 x – tan x .

33. If (x + iy) ^{3} = u + iv, then show that $\frac{u}{x} + \frac{v}{y} = 4(x^2 - y^2)$.

34. Find all pairs of consecutive odd positive integers both of which are smaller than 10 such that their sum is more than 11.

35. Evaluate $\left(\sqrt{3} + \sqrt{2}\right)^6 - \left(\sqrt{3} - \sqrt{2}\right)^6$.

36. If the angle between two lines is π/4 and slope of one of the lines is 1/2 find the slope of the other line.

37. Find the equation of the set of points P such that its distances from the points A (3, 4,-5) and B (-2, 1, 4) are equal.

38. Find the derivative of tan x w. r. t x from first principle.

PART – D

Answer any FOUR questions **4 × 5 = 20**

39. Define Signum function. Draw the graph of it. Also write its domain and range.

40. Prove that $\frac{\sin 3x + \sin 5x + \sin 7x + \sin 9x}{\cos 3x + \cos 5x + \cos 7x + \cos 9x} = tan6x.$

41. In how many ways can the letters of the word PERMUTATIONS be arranged if the
i) words start with P and end with S, (ii) vowels are all together,
iii) there are always 4 letters between P and S?

42. Derive an expression for the perpendicular distance between a point (x_1, y_1) and a line $Ax + By + C = 0$.

43. Prove that ,for any positive integer n, $\lim_{x \to 0}\left[\frac{x^n - a^n}{x - a}\right] = na^{n-1}$, and hence evaluate $\lim_{x \to 1}\left[\frac{x^{15} - 1}{x^{10} - 1}\right]$

44. Find the variance and standard deviation for the following data

x_i	4	8	11	17	30	24	32
f_i	3	5	9	5	4	3	1

45. Three coins are tossed once. Find the probability of getting (i) 3 tails (ii) exactly two tails (iii) no tail (iv) atmost two tails

PART-E

Answer the following question.

46. If $sinx = \frac{1}{4}$, x in quadrant II , then find $\sin\frac{x}{2}, \cos\frac{x}{2}, \tan\frac{x}{2}$. **6**

OR

Define ellipse and derive the equation of the ellipse in standard form as $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$.

47. Find the derivative of $f(x) = \frac{x^5 - cos\, x}{sin\, x}$ with respect to x. **4**

OR

Find the sum of the series up to n terms 5 + 55 +555 + ...

PART F

(For Visually Challenged Students only)

13. *Let* $f(x) = \frac{|x|}{x}$, $x \neq 0$ and $f(x) = 0$, $x = 0$.

Statement 1: The given function limit exists at x =1 and x = -1

Statement 2: The given function limit exists at at x= 0

A)Statement 1 is true and Statement 2 is false

B) Statement 1 is false and Statement 2 is true

C)Both Statement 1and 2 are true

D)Both Statement 1 and 2 are false

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GOVERNMENT OF KARNATAKA

DEPARTMENT OF SCHOOL EDUCATION (PRE UNIVERSITY)

Model Question Paper -2

I P.U.C.MATHEMATICS (35) :2024-25

Time: 3 hours **Max. Marks: 80**

Instructions:

1) *The question paper has five parts namely A, B, C, D and E. Answer all the parts.*

2) *PART A has 15MCQ's ,5 Fill in the blanks of 1 mark each.*

3) *For questions having figure/graph, alternate questions are given at the end of question paper in separate section for visually challenged students.*

PART – A

I Answer all the multiple-choice questions: **15 × 1 = 15**

1. The interval form of $\{x: x \in R, -5 < x \leq 7\}$ is

   A) (-5, 7) B) [-5, 7] C) {-5, 7} D) (-5, 7]

2. A function f is defined by $f(x) = 2x - 5$, then the value of f(0) is

   A) − 3 B) −4 C) −5 D) 7

3. The range of f (x) = sin x is

   A) [0, ∞) B] (-∞, ∞) C) [-1, 1] D) (-1, 1)

4. The additive identity of $\sqrt{5}$ + 3i is

   A) 0 + 1i B) 0 + 0i C) $\sqrt{5}$ - 3i D) $\frac{\sqrt{5}-3i}{\sqrt{14}}$

5. The standard form of (-5i) $\left(\frac{1}{8}i\right)$ is

   A) $\frac{-5}{8}$ + i0 B) 0 + $\frac{5}{8}$i C) 5 + 8i D) $\frac{5}{8}$ + i0

6. The solution of 3x + 8 > 2, when x is a real number is

A) (-2, ∞) B) (-∞, -2) C) (-∞, -2] D) (-∞, -1)

7. The equation of the line, which has slope 2 and y-intercept -5 is.

A) $2x - y - 5 = 0$ B) $2x + y - 5 = 0$ C) $2x - y + 5 = 0$ D) $2x + y + 5 = 0$

8. Match List I with List II

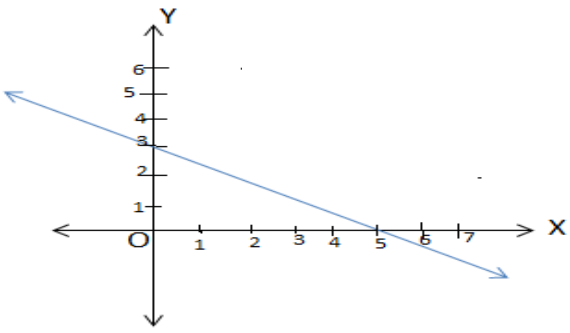
List I	List II
a) ${}^5C_0$	i) 20
b) ${}^5P_2$	ii) 10
c) ${}^5C_2$	iii) 1

Choose the correct answer from the options given below:

A) a-i , b-ii, c-iii B) a-iii, b-ii, c-i

C) a-ii, b-i, c-iii D) a-iii, b-i, c-ii

9. The equation of line in the figure is



A) $5x + 3y = 15$

B) $3x + 5y = 15$

C) $3x + 5y + 15 = 0$

D) $5x + 3y + 15 = 0$

10. The fifth term whose n^{th} term is $a_n = n(n + 2)$ is

A) 30 B) 35 C) 40 D) 45

11. Statement 1:The eccentricity of hyperbola $9x^2 - 16y^2 = 144$ is $\frac{5}{4}$

Statement 2:The eccentricity of hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is $\frac{\sqrt{a^2+b^2}}{a}$.

A) Statement 1 is true and Statement 2 is false.

B) Statement 1 is false and Statement 2 is false.

C) Statement 1 is true and Statement 2 is true, Statement 2 is a correct explanation for Statement 1

D) Statement 1 is true and Statement 2 is true, Statement 2 is not a correct explanation for Statement 1

12. The axis in which the point (0, 5, 0) lies is

A) $x-axis$ B) $y-axis$ C) $z-axis$ D) $x + y = 0$

13. $\lim_{x \to -1} (x^3 - x^2 + 1)$ is

A) -1 B) 0 C) 1 D) 2

14. The median of 3, 10, 6, 7, 11, 13, 15 is

A) 7 B) 9 C) 10 D) 11

15. The probability of getting exactly two heads on tossing a coin thrice is

A) $\frac{2}{3}$ B) $\frac{2}{5}$ C) $\frac{3}{8}$ D) $\frac{1}{2}$

II. Fill in the blanks by choosing the appropriate answer from those given in the bracket (1, -1, 64, 2, 4, 20) **5 ×1 = 5**

16. Let A = {x, y, z} and B {1, 2}, then the number of relations from A to B is _____.

17. The slope of the line passing through the points (4, 0) and (6, 4) is _____.

18. The value of $\sin\left(\frac{5\pi}{2}\right)$ is _____.

19. The second term in the expansion of $(\sqrt{2}+1)^5$ is _____.

20. The number of solutions of $24x < 100$ when x is a natural number is _____.

PART – B

Answer any SIX questions: **6 × 2 = 12**

21. If $A \times B = \{(a,1)\ (a,2)\ (a,3)\ (b,1)\ (b,2)\ (b,3)\}$, find the sets A and B and hence find $B \times A$.

22. Express $i^{18} + \left(\frac{1}{i}\right)^{25}$ in a + i b form.

23. Find the multiplicative inverse of 2 – 3i.

24. Using binomial theorem evaluate $(102)^5$.

25. The sum of first three terms of a G.P. is $\frac{13}{12}$ and their product is – 1. Find the common ratio and the terms.

26. Find the angle between the lines $\sqrt{3}\,x + y = 1$ and $x + \sqrt{3}\,y = 1$.

27. Evaluate: $\lim_{x\to 1}\left(\frac{x^{15}-1}{x^{10}-1}\right)$

28. Find the derivative of f(x) w. r. t x from first principal given that $f(x) = sinx$.

29. If P(A) = $\frac{2}{3}$ and P(B) =$\frac{1}{2}$, find P(A or B) and P(A and B) if A and B are mutually exclusive.

PART – C

Answer any SIX questions: **6 ×3 = 18**

30. If U = {1, 2, 3, 4, 5, 6, 7, 8, 9}, A = {2, 4, 6, 8} and B = {2, 3, 5, 7}. Verity that $(A \cup B)' = A' \cap B'$.

31. Draw the Venn diagram for (i) $A \cup B$ (ii) $A - B$ (iii) $(A \cap B)'$

32. Find the values of other five trigonometric functions if cot x = $\frac{-5}{12}$, x lies in second quadrant.

33. Prove that sin 3x = 3 sin x – 4 $\sin^3$x.

34. Solve the inequality and show the graph of the solution on the number line

$\frac{3x-4}{2} \geq \frac{x+1}{4}$ - 1.

35. Find the number of Permutations of the letters of the word PERMUTATIONS. Among them how many have vowels are all together?

36. Expand using binomial theorem $\left(1+\frac{x}{2}-\frac{2}{x}\right)^4, x \neq 0$.

37. Reduce the equation of the circle $x^2 + y^2 - 4x - 8y - 45 = 0$ into Centre-radius form and hence find its centre and radius.

38. If the origin is the centroid of the triangle PQR with vertices P (2a, 4, 6), $Q(-4, 3b, -10)$ and $R(8, 14, 2c)$ then find the values of a, b, c.

PART – D

Answer any FOUR questions: **4 × 5 = 20**

39. Define modulus function, draw the graph. Write the domain and the range.

40. Prove that $\frac{\cos 4x + \cos 3x + \cos 2x}{\sin 4x + \sin 3x + \sin 2x}$ = cot 3x.

41. A group consists of 7 boys and 5 girls. Find the number of ways in which a team of 5 members can be selected so as to have at least one boy and one girl.

42. Derive the equation of a line with x-intercept 'a' and y-intercept 'b' in the form of $\frac{x}{a} + \frac{y}{b}$ = 1. Hence find the equation of a line that cuts off equal intercepts on the coordinate axes and passes through the point (2, 3).

43. Prove geometrically that $\lim_{x \to 0} \frac{\sin x}{x}$ = 1, x being measured in radians.

44. Find the mean deviation about median for the following data

Marks	0-10	10-20	20-30	30-40	40-50	50-60
No.of girls	6	8	14	16	4	2

45. One card is drawn from a well shuffled deck of 52 cards. If each outcome is equally likely, calculate the probability that the card will be (i) a diamond (ii) not an ace (iii) a black card (i.e., a club or, a spade) (v) not a black card.

PART - E

Answer the following questions:

46. Prove geometrically that cos (A + B) = cosAcosB – sin A sin B. Hence prove that cos 2A = $\cos^2 A - \sin^2 A$.

OR **(6)**

Define Hyperbola. Derive its equation in the form $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$

47. If A.M. and G.M. of two positive numbers a and b are 10 and 8, respectively, find the numbers. **(4)**

OR

Differentiate $\frac{\sin x + \cos x}{\sin x - \cos x}$ with respect to 'x'.

PART F

(For Visually Challenged Students only)

9. The Equations for x and y axes are

(A) $x = 1$, $y = 1$ (B) $y = 1$ (C) $x = 0$ *and* $y = 0$ (D) $x = 1$ *ann* $y = 0$.

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GOVERNMENT OF KARNATAKA
DEPARTMENT OF SCHOOL EDUCATION (PRE UNIVERSITY)

Model Question Paper -3

I P.U.C: MATHEMATICS (35) :2024-25

Time : 3 hours **Max. Marks : 80**

Instructions :

1) *The question paper has five parts namely A, B, C, D and E. Answer all the parts.*

2) *PART A has 15 MCQ's ,5Fill in the blanks of 1 mark each.*

3) *For questions having figure/graph, alternate questions are given at the end of question paper in separate section for visually challenged students.*

PART A

I. Answer ALL the Multiple Choice Questions **15 ×1 = 15**

1. Which of the following is not correct

(A) The set Q of rational numbers is a subset of the set R of real numbers

(B) $\{x : x \text{ is an even natural number}\} \subset \{x : x \text{ is an integer}\}$

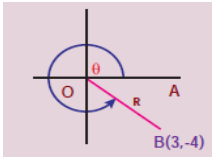
(C) If A is the set of all prime divisors of 56 and B the set of all divisors of 56 then $B \subset A$

(D) $\{1,5,9\} \subset \{1,3,5,7,9\}$

2. Let A = { 1, 2, { 3, 4 }, 5 }. Which of the following statement is correct?

A)$\{3, 4\} \subset A$ B)$\{3, 4\} \in A$ C) $3 \in A$ D) $4 \in A$.

3. The terminal side of an angle θ in standard position passes through the point $(3,-4)$as in the following figure, then sinθ =



A) $-\frac{3}{4}$ B] $\frac{3}{5}$ C) $-\frac{4}{5}$ D) $-\frac{3}{5}$

4. If sin2x= 2sinxcosx then sin6x is equal to

A) 2sinx cosx B) 2 sin6x cos6x C)2 sin3x cos3x D) sin6x cos6x

5. The value of $\left(-\sqrt{-1}\right)^{4n+2}, n \in N$ is

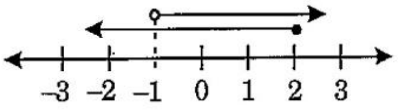
(A) 1 (B) $-i$ (C) i (D) -1.

6. $\sum_{k=0}^{n} 3^r n_{C_r}$ =

(A) 2^n (B) 3^n (C) 4^n (D) n.

7. The diagram represents two simultaneous linear inequalities on a number line.

Which of the following inequalities is the solution?



(A) $-1 \leq x < 2$ (B) $2 \leq x < -1$ (C) $-1 > x \geq 2$ (D) $-1 < x \leq 2$

8. Statement I: The point (0,2) is at 2 units distance from *X*-axis above the origin

Statement II: The point (2,0) is at 2 units distance from the Y- axis left of origin

(A) Both statements are true (B) Statement I is true and statement II is false

(C) Statement I is false and statement II is true (D) Both statements are false.

9. The two lines $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ where $b_1, b_2 \neq 0$ are

I. Parallel if $\frac{a_1}{a_2} = \frac{b_1}{b_2}$

II. Perpendicular if $a_1.a_2 - b_1b_2$=0

(A) Both I and II are true (B) only I is true

(C) only II is true (D) Both I and II are false

10. The radius of the circle $x^2 + y^2 + 8x + 10y - 8 = 0$ is

A) 8 B) 5 C) 6 D) 7

11. The derivative of f(x)=1+ x + x^2 + x^3 + x^4 +.....x^{50} at x =1 is

(A) 1275 (B) 1200 (C) 1326 (D) 1542

12. The point (-2, -3, -4) lies in the

A) First Octant B)Seventh octant C) Second octant D) Eighth octant

13. Consider the function f(x)=$\begin{cases} 1 & x \leq 0 \\ 2 & x > 0 \end{cases}$, then left hand limit of f(x) at x=0 is

A) 1 B) 2 C) 0 D) 3

14. The median of the observations 3, 9, 5, 3, 12,10, 18, 4, 7, 19, 21 is

A) 7 B) 9 C) 10 D) 11

15. If A is any event associated with a sample space S then

A) $0 \leq P(A) \leq 1$ B) $1 < P(A) < 2$ C) $P(A) \geq 1$ D) $P(A) \leq 0$.

II. Fill in the blanks by choosing the appropriate answer from those given in the bracket (0,1, 2,3, 4,5) **5 × 1 = 5**

16. If $\left(\frac{x}{3}+2,\ y-\frac{2}{3}\right)=\left(\frac{5}{3},\ \frac{1}{3}\right)$, then the value of y is _____.

17. The value of sin 4π is _____.

18. The total number of possible subsets of set A={ a, b} is _____.

19. If ${}^{15}C_{3r} = {}^{15}C_{3+r}$ then r is _____.

20. If the sequence a_n is defined as $a_1 = 1$ and $a_n = a_{n-1} + 2$ for n≥2 , then a_3 is _____

PART-B

ANSWER ANY SIX QUESTIONS **6 × 2 = 12**

21. If U= {1, 2, 3, 4, 5, 6, 7, 8, 9}, A= {3, 4, 5, 6} B= {2, 4, 6, 8},then find $(A-B)^C$

22 If A = { 3, 5, 7, 9, 11 }, B = {7, 9, 11, 13}, C = {11, 13, 15}, then find A ∪ (B ∩ C) .

23. Prove that $cos\left(\frac{3\pi}{2}+x\right)cos(2\pi+x)\left[cot\left(\frac{3\pi}{2}-x\right)+cot(2\pi+x)\right]=1$

24. Express the complex number $(1-i)^4$ in a + ib form

25. Solve the inequalities 5x – 3 ≥ 3x – 5 and show the graph of the solution on number line.

26. Ravi obtained 70 and 75 marks in first two unit test. Find the minimum marks he should get in the third test to have an average of at least 60 marks.

27. Find an approximation of $(0.99)^5$ using the first three terms of its expansion..

28. A.M and G.M. of roots of a quadratic equation are 8 and 5, respectively, then find the quadratic equation.

29. Consider the experiment of rolling a die.Let A be the event 'getting a prime number', B be the event 'getting an odd number'. Write the sets representing the events (a) A or B (b) A but not B

PART –C

ANSWER ANY SIX QUESTIONS : **6 × 3 = 18 .**

30. Let A = {1, 2, 3, 4, 6}. Let R be the relation on A defined by R={(a, b): a, b ∈ A, b is exactly divisible by a}.(i) Write R in roster form, (ii) Find the domain of R (iii) Find the range of R.
31. Prove that $sin^2 6x - sin^2 4x = sin 2x \sin 10x$.
32. Find the conjugate of $\frac{(3-2i)(2+3i)}{(1+2i)(2-i)}$.
33. In how many of the distinct permutations of the letters in MISSISSIPPI do the four I's not come together?
34. Using binomial theorem, show that $9^{n+1} - 8n - 9$ is divisible by 64, whenever n is a positive integer.
35. If p is the length of perpendicular from the origin to the line whose intercepts on the axes are a and b, then show that $\frac{1}{a^2} + \frac{1}{b^2} = \frac{1}{p^2}$.
36. Find the coordinates of the focus,the equation of the directrix and latus rectum of the parabola $x^2 - 8y = 0$
37. Show that the points P (-2, 3, 5), Q (1, 2, 3) and R (7, 0, -1) are collinear.
38. Find the derivative of $f(x) = \frac{1}{x^2}$, from first principal.

PART – D

Answer any FOUR questions **4 × 5 = 20**

39. Define polynomial function. . If the function f: $R \to R$ is defined by f(x) = x^3, draw the graph of it. Also write its domain and range.
40. Prove that $cos^2 x + cos^2\left(x + \frac{\pi}{3}\right) + cos^2\left(x - \frac{\pi}{3}\right) = \frac{3}{2}$
41. A committee of 7 has to be formed from 9 boys and 4 girls. In how many ways can this be done when the committee consists of:
    (i) exactly 3 girls ? (ii) atleast 3 girls ? (iii) atmost 3 girls ?
42. Derive an expression for the acute angle between two lines having slopes m_1 and m_2 and hence find the slopes of the lines, if the slope of a line is double of the slope of another line . If tangent of the angle between them is $\frac{1}{3}$.

43. Prove geometrically that $\lim_{x\to 0} \frac{\sin\theta}{\theta} = 1$, θ being measured in radians.

44. Find the mean deviation about the mean for the following data

Marks Obtained	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Number of Students	2	3	8	14	8	3	2

45. On her vacations Veena visits four cities (A, B, C and D) in a random order. What is the probability that she visits (i) A before B ? (ii) A before B and B before C ?

PART-E

Answer the following question.

46. Prove geometrically that $cos(x+y) = cosxcosy - sinxsiny$ and hence prove that $cos75^0 = \frac{\sqrt{3}-1}{2\sqrt{2}}$.

OR

Define and derive the equation of parabola in the standard form $y^2 = 4ax$ and find the latus rectum of the parabola $y^2 = -9x$ **6**

47. Find the derivative of $f(x) = \frac{x+cos\,x}{tan\,x}$ with respect to x.

OR

The sum of first three terms of a G.P. is 16 and the sum of next three terms is 128. Determine the first term and the common ratio. **4**

PART F

(For Visually Challenged Students only)

3. The terminal side of an angle θ in standard position passes through the point $(3,-4)$as in the 2rd quadrant , then sinθ =

A) $\frac{4}{5}$ B] $\frac{3}{5}$ C) $-\frac{4}{5}$ D) $-\frac{3}{5}$

7. The solution of the inequality $-1 \geq x$ **and** $x \geq 1$ **for real x.**

A) [-1 , 1]. *B)* $(-\infty,-1] \cup [1,\infty)$ *C)* $(-1,1)$ *D)* $(-\infty,-1) \cup (1,\infty)$.

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